An Invitation to Participate in a Watershed Plan for Powhatan Creek

You are invited to participate in developing a watershed plan to protect Powhatan Creek. This document explains the watershed planning process that will be used over the next several months. The study, being funded by James City County, seeks to protect one of Virginia's most important and beautiful creeks. The Center for Watershed Protection and the James River Association are under contract to James City County to develop the plan.

Why is a Watershed Plan Needed?

Powhatan Creek's watershed is 23 square miles in area, and is almost entirely contained within James City County, just west of the City of Williamsburg. The creek drains directly to the James River near Jamestown Island, the first permanent settlement in North America and still a major tourist destination. Powhatan Creek is notable for its exceptional biodiversity. In fact, it was recently ranked as having the greatest significance for biodiversity and natural areas in the lower Peninsula of Virginia. Some 5,510 acres of the watershed have been designated as primary or secondary conservation areas, which comprise over 35% of the total watershed area. Rare or endangered plants such as the small whorled pogonia, Virginia least trillium, false hopsedge are found, as well as bald eagle habitat and an important heron nesting colony. Much of the biodiversity is found within the 1,700 acres of floodplain in the watershed, which is an extensive complex of wooded swamps, freshwater wetlands, beaver ponds, and tidal marshes. A mosaic of other natural features are also found along the tributary streams and upland forests. Powhatan Creek, an important tributary to the Chesapeake Bay, is also known for its great fishing and hunting, and is a great place to enjoy nature.

The development history of Powhatan Creek is also interesting. The watershed was cultivated for several hundred years, before reverting back to second growth forest in the early part of this century. Nearly all of the watershed was wooded until about 1970, when the Soil Conservation Service noted that it was only 8% developed. In the last 30 years, however, the watershed has experienced a great deal of growth pressure, particularly in the northeastern part of watershed over the last decade.

The impact of past development has prompted concerns about the health of the Powhatan Creek. Some increased flooding has been observed, but the largely protected floodway[1] is still able to accommodate these flows, with some minor exceptions. The smallest tributary streams that feed into the mainstem of Powhatan Creek have shown the greatest degradation, with accelerated channel erosion reported in the upper portions which creates sediment deposition within the floodplain and its associated wetlands. From a water quality standpoint, Powhatan Creek can have high levels of bacteria during wet weather, which has caused localized closures of shellfish beds in the James River. In addition, given that Powhatan Creek is a tributary to a Chesapeake Bay tributary, reducing both phosphorus and nitrogen is a primary management objective. Finally, the rare and endangered plants present in the floodplain are quite vulnerable to changes in hydrology, particularly fluctuations in water levels.

What is the Powhatan Creek Watershed?

The Powhatan Creek watershed is all of the land area surrounding Powhatan Creek that drains to the creek's mouth just above Jamestown (see Figure 1). Currently, about 40% of the land area within the watershed is developed and portions of the watershed are zoned for future development. This presents a common challenge to protect the vital water resources in Powhatan Creek. In developed portions of the watershed, past land use decisions and current activities have diminished water quality and biological diversity. In undeveloped portions of the watershed, future land use decisions could contribute to watershed degradation and potentially jeopardize some of the outstanding wetlands and habitats that make the watershed so unique.

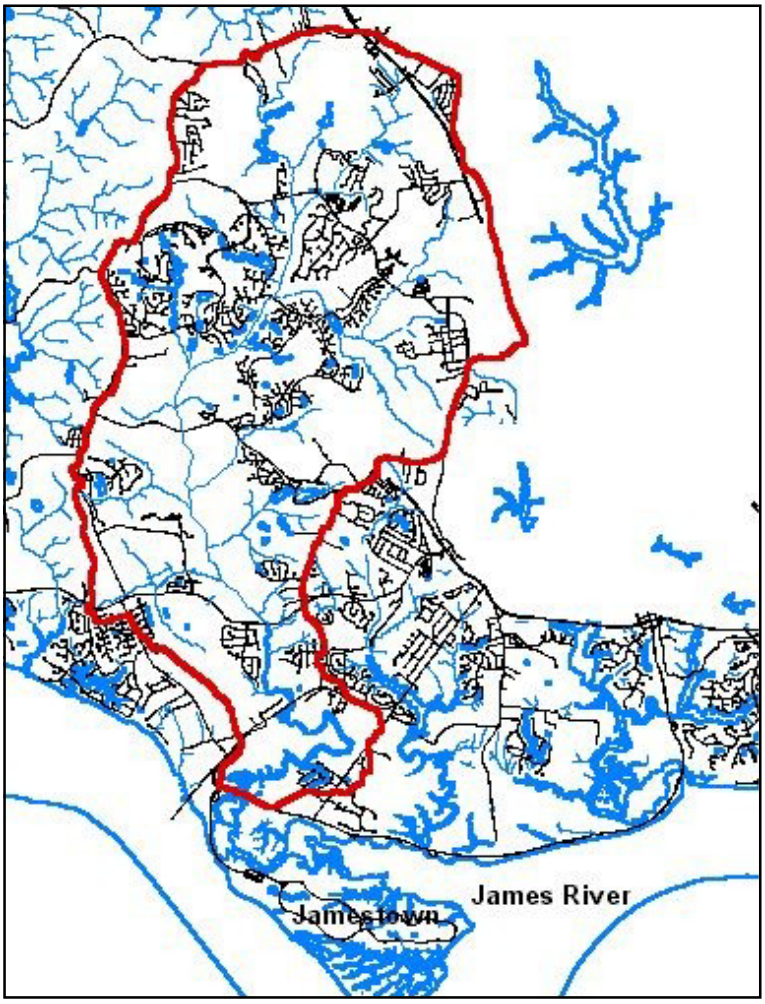

Figure 1. Boundaries of Powhatan Creek Watershed.

A stream's quality is strongly influenced by watershed-wide factors. Increased impervious cover[2] reduces infiltration of rainfall into the soil and increases the amount of stormwater runoff. This change to the natural water balance increases storm flow and velocities in streams that feed into Powhatan Creek. Increased stormwater flow increases channel erosion and the transport of pollution downstream to the James River. Impervious cover is often used as an indicator of other pollutants in a watershed. More impervious cover means more pollution sources such as nutrients, pesticides, oil, grease, and trace metals. In short, the intensity of what is done on the land contributes to the quality of the streams and rivers in a watershed.

In an urbanizing watershed such as Powhatan Creek, the many intertwining relationships between land use, human activity, rainfall, development, and stream quality mean that resource protection and management must occur across the entire watershed. The implementation of a watershed protection strategy involves the integration of complex tools and techniques with the common realities of how watershed residents lead their daily lives. This is the essence of watershed planning. The Center for Watershed Protection and the James River Association have teamed up to assist James City County with the development of a watershed plan for Powhatan Creek.

What Exactly is a Watershed Plan?

The basic goal for developing the watershed plan for Powhatan Creek is to incorporate a scientific and credible strategy that involves and engages the public to agree on an effective plan to maintain the creek's exceptional resource quality.

The Center for Watershed Protection has developed a comprehensive approach for watershed planning. The core of our approach is simply to conduct a process to get communities to make the best choices possible about how to implement watershed management strategies.

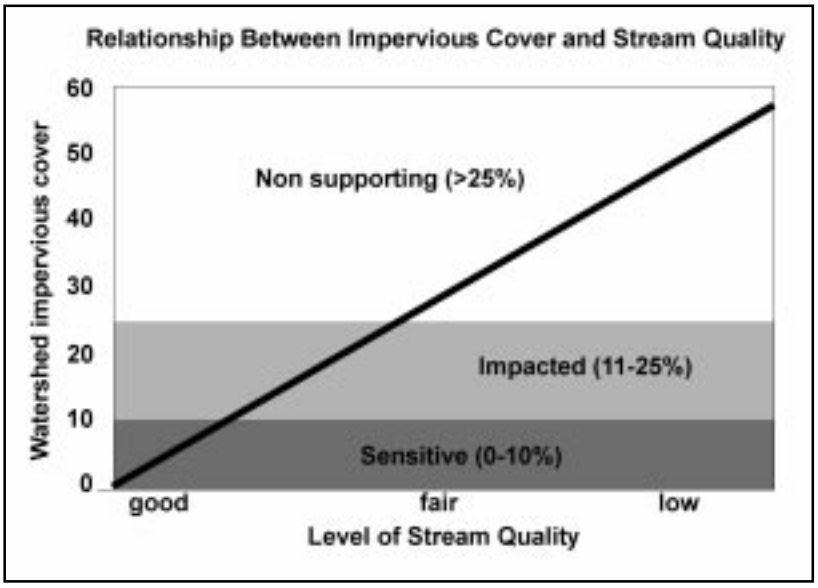

Figure 2. Impervious Cover Model.

An integral part of the proposed watershed plan involves estimating the influence of impervious cover on the quality of streams within Powhatan Creek. Recent research has indicated that the amount of impervious cover in a watershed can be used to predict current and future quality of a watershed's streams. Based on the findings of this research, the Center has developed a simple Impervious Cover Model (see Figure 2) that can be used to classify watershed and subwatershed health, and generally indicate where certain levels of stream quality exist. At about 10% impervious cover, for example, many of the most sensitive aquatic species show signs of severe impairment. A second threshold appears to exist at around 25 to 30% impervious cover, where most indicators of stream quality consistently shift to a poor condition (e.g., diminished aquatic diversity, water quality and habitat).

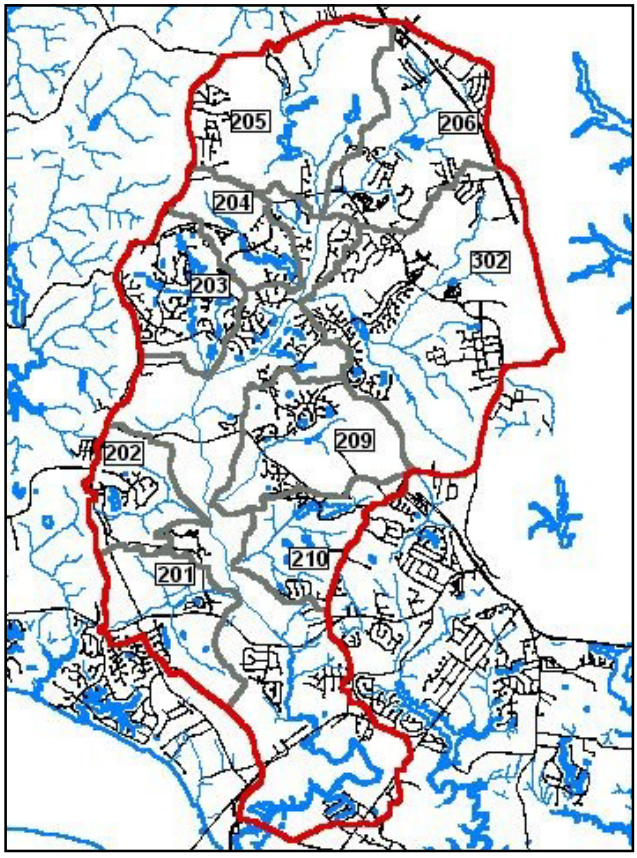

Figure 3. Locations of subwatersheds.

Powhatan Creek has several tributaries that contribute to the drainage network of the watershed. The Center has delineated these several tributaries into what we refer to as *subwatersheds*, or subsets of the entire watershed (See Figure 3). Nine separate subwatersheds exist for Powhatan Creek that range in size from slightly below a square mile to nearly four and a

half square miles in area. The impervious cover of these subwatersheds ranges from about 4% to nearly 12% (see Table 1). This serves as the basic starting point for the Powhatan Creek watershed plan. In those subwatersheds with the lowest current impervious cover, the plan should likely be oriented towards the goal of maintaining the most sensitive ecosystems, while in the more developed subwatersheds, the plan might be oriented towards enhancing or reversing impacts from past activities (see the photos that illustrate some of the character of Powhatan Creek's streams at the conclusion of this report).

Table 1: Existing Impervious Cover in Powhatan Creek's Subwatersheds

Subwatershed Identification #	Drainage Area (acres)	Impervious Cover (%)
201	836	5.7
202	601	5.3
203	849	9.7
204	541	909
205	1,617	4.9
206	1,317	12.6
302	2,851	12.3
209	1,083	4.3
210	717	10.7
Entire Watershed (at mouth)	**14,213**	**10.1**

Another important concept of the watershed planning process involves a recognition that there are a set of proven methods to help protect Powhatan Creek. The Center has arranged these strategies into eight separate categories representing different stages in the land use/land alteration cycle —we refer to these categories as the *eight tools of watershed protection*. When applied together, these eight tools can comprehensively protect and manage urban subwatersheds in the face of future growth and can be applied to restore subwatersheds where development has already occurred. The proposed watershed planning approach incorporates a methodology for applying these tools to the unique conditions of particular watersheds. Each subwatershed in Powhatan Creek will have its own distinct prescription for watershed protection. The general description of each of these tools is described below.

Perhaps the most important tool for watershed protection is **Watershed Land Use Planning**, which involves decisions on the amount and location of development and impervious cover, and requires choices to apply appropriate land use and growth management techniques. The second tool, **Land Conservation,** involves choices about the types, location, and the relative importance of different lands that need to be conserved to help protect the natural systems and biological communities within a subwatershed. **Aquatic Buffers** are the third tool. This management measure seeks to maintain a physical separation distance from the stream or wetland and land disturbance activities. The aquatic buffer is one of the more reliable tools to help maintain the integrity of streams, shore-

lines, and wetlands. The fourth tool is **Better Site Design**. This tool seeks to encourage the design of individual development projects with less impervious cover and more diffuse stormwater runoff patterns that will reduce impacts to local streams. **Erosion and Sediment Control** is the fifth tool, and deals with the clearing and grading stage in the development cycle when runoff can carry high quantities of sediment into nearby waterways.

The sixth tool, **Stormwater Treatment Practices**, involves choices about how, when, and where to provide stormwater management within a subwatershed, and which combination of stormwater treatment practices can best meet subwatershed and watershed protection objectives. Tool number seven is **Non-Stormwater Discharges**, and promotes ways to control discharges from wastewater disposal systems, illicit or inappropriate connections to the storm drainage system, and reducing pollution from household and industrial sites. The final tool is **Watershed Stewardship Programs** which promote private and public stewardship of the watershed over the long term.

The good news is that James City County is already doing many important things to apply the tools for watershed protection. For example, they have recently updated their stormwater management program to be one of the best in the Commonwealth of Virginia. All new development must limit impervious cover to a maximum of 60%, and the County has preserved significant open space and conservation areas through the development process.

It is important to emphasize that each watershed protection tool is flexible and can, and should, be applied differently in each subwatershed. Their application will also depend on the subwatershed Impervious Cover Model classification category. For example, if development is being planned in an area that falls into the "sensitive stream" category, the tools involving watershed land use planning, land conservation and site design may be more heavily weighted than in an "impacted stream" category.

What is the Basic Process for the Powhatan Creek Watershed Plan?

The following outlines the basic approach to develop and implement a watershed management plan for Powhatan Creek by July of 2001. In several instances, we've identified where stakeholder interaction is needed to help develop an effective plan.

Establish Watershed Baseline

The first step is currently underway where existing information on the condition of Powhatan Creek is compiled, reviewed and analyzed. This information will provide James City County and other watershed stakeholders a strong technical foundation for the development of the watershed plan. The product of this step will be a draft watershed assessment report for Powhatan Creek and will:

1. Delineate Watershed and Subwatershed Boundaries
2. Identify Key Watershed Stakeholders
3. Measure Current Impervious Cover
4. Assemble Existing Monitoring Data
5. Evaluate and Compile Water Resource Maps
6. Estimate Future Impervious Cover for Subwatersheds, and
7. Assess Current Watershed Protection Capability of James City County

Initial Watershed Stakeholder Meeting - November 29, 2000 at the James City County Human Resources Center

This component of a good watershed plan involves input and active participation from all stakeholders in Powhatan Creek. With this in mind, the Center and James River Association will conduct a two meetings on November 29, 2000 at the James City County Human Resources Center. Key findings from the baseline assessment report will be presented and stakeholders will provide input on key management priorities and participate in a planning exercise to set goals and objectives for each subwatershed within the Powhatan Creek watershed.

Special Watershed Studies

Three watershed assessment studies are being conducted to support the Powhatan Creek watershed plan. These include:

1. Priority Ranking of Key Conservation Areas in Powhatan Creek

The Powhatan Creek is unique in that it contains extensive and exceptional natural areas and wildlife habitat. As noted earlier, 35% of the Powhatan Creek watershed has been designated as important conservation areas in past natural area inventories. In addition, many of the rare and endangered plants and animals documented in these inventories are associated with the aquatic community, and may be adversely affected by increased runoff from upstream development. Past surveys have primarily concentrated on critical plant and animal habitats, but have not been integrated with other potential conservation areas, such as aquatic corridors, hydrologic reserve areas, water pollution hazards, and cultural/historic areas. It is important that all conservation areas that are important to the watershed be comprehensively assessed, including floodplains, non-tidal wetlands, historic sites, forest conservation areas and tributary streams.

This fall, the Center has been surveying potential conservation areas within the watershed while reviewing the range of regulatory and non-regulatory land conservation tools available for James City County. This information will be used to prioritize which conservation areas are at greatest or most immediate risk due to upstream development. We will then solicit the advice of watershed stakeholders on which specific conservation areas should have the highest priority for private or public sector conservation.

2. *Rapid Stream Assessment in Upper Tributaries of Powhatan Creek*

A key concern in Powhatan Creek is the condition of the headwater streams that drain from upper tributaries down to the mainstem portion of the creek. These headwater streams are critically important for three reasons. First, many now experience erosion as a result of upstream development, and are likely to be the major source of sediment deposition to downstream wetlands. Second, small streams are the hydrological link between upstream development and the downstream wetlands. Recent research has shown that wetlands can be degraded by stormwater runoff from upstream development that increases water level fluctuation within the wetlands. Consequently, headwater streams are the natural hydrological control point in the watershed. Third, the headwater streams in Powhatan Creek are believed to have high fish and macroinvertebrate diversity. Thus, maintaining the biological diversity of these streams may be a prime objective of the watershed study.

This fall, the Center conducted an intensive survey of the headwater streams of Powhatan Creek, using a stream assessment survey called the Rapid Stream Assessment Technique (RSAT). The RSAT technique measures channel stability, scour/deposition, instream habitat, visual water quality, riparian conditions, and the biological status of the stream. This information will provide James City County and interested stakeholders with a quantitative rating of the overall quality of each stream in Powhatan Creek.

3. Regional Stormwater Management Planning

This third study involves a detailed assessment of existing and future stormwater treatment options to protection Powhatan Creek. The plan is to provide the best locations for either on-site or regional ponds. The facilities will help prevent channel erosion and remove pollutants delivered to the stream, so as to protect the downstream wetlands and conservation areas. Finding the optimal locations for these ponds is a complicated affair, given the large number of conservation areas to be protected, environmental permitting constraints, and topography in the County. Consequently, the inventory of the best sites in the watersheds will be assessed through a field survey process in conjunction with the RSAT investigation.

Watershed and Subwatershed Plans

Later this spring, the stakeholders will be invited to review and comment on draft watershed and subwatershed management maps prepared by the Center and James River Association. These maps delineate the locations of proposed watershed protection projects, such as:

- Recommended modifications to land use or zoning
- Priority conservation areas
- Adjustments to resource management and resource protection area boundaries
- Sites for stream channel erosion protection and/or restoration
- Optimal locations for stormwater ponds
- Reforestation areas, and
- Other key watershed management areas

Stakeholders will also help develop the draft watershed management plan, which will contain specific recommendations on how the eight tools of watershed protection should be applied in each subwatershed. In the final stage, the Center will incorporate stakeholder comments and produce a final watershed management plan for Powhatan Creek and present the plan to the James City County Board of Supervisors for formal adoption.

Who is the Center for Watershed Protection?

The Center for Watershed Protection is a nonprofit 501(c)(3) organization dedicated to finding new, cooperative ways of protecting and restoring our watersheds. Its principal functions are conducting independent research and providing technical support to local governments and watershed management professionals around the country to develop more effective urban stormwater management and watershed protection programs. Since its inception, the Center has provided technical assistance to local governments in 30 states and the District of Columbia. This close contact enables the Center to understand the unique needs and concerns of local and state governments in this emerging area of environmental practice. Past and present projects include the development of stormwater design and guidance manuals for the states of Maryland, New York, Massachusetts, Texas and Georgia as well as the District of

Columbia. In addition, the Center has conducted more than 300 stormwater training workshops, and has conducted watershed planning projects in the Wachusetts Reservoir and Charles River watersheds in Massachusetts; the Kensico Reservoir watershed and Staten Island in New York; the Rock Creek, Longwell Branch, Oxon Run, Watts Branch, and the Anacostia River watersheds in Maryland; the Doan Brook and Darby Creek in Ohio; and Englesby Brook in Burlington, Vermont. The Center has a staff of thirteen professionals and support personnel and is located in Ellicott City, Maryland.

Who is the James River Association?

The James River Association is a non-profit citizens' organization dedicated to the conservation and responsible stewardship of the natural and historic resources of the James River Watershed. The Association's goals are: to ensure the quality and responsible use of the James River and its natural and historic resources; to encourage orderly and sustainable development and land uses; to enhance the quality, quantity, and diversity of aquatic and wildlife resources in the James River Watershed; to increase public education for greater appreciation of the James River; and to promote effectively managed public access to the James River. We are currently running a Riparian Lands Program to establish forested buffers along the banks of the mainstem James, as well as James River tributaries. We were also recently approved as the James Riverkeeper, a program we will launch in 2001. We continue to seek opportunities to protect and conserve the unique resources of the James River Watershed.

Who do I contact to get involved?

Jenny West, Director of Development/Communications for the James River Association, is the point of contact for intested stakeholders for this project. She can be reached at JRA's office at P.O. Box 110, Richmond, VA, 23218, or by phone at 804-730-2898. You may also send Ms. West an e-mail at jwest@jamesriverassociation.org.

Tom Schueler, the Executive Director for the Center for Watershed Protection, is the project manager for the Powhatan Creek watershed plan. He can be reached at the Center's offices at 8391 Main Street, Ellicott City, MD or by phone at 410-461-8323, or e-mail at trs@cwp.org. Or contact Jennifer Zielinski, also with the Center, at 410-461-8323, or e-mail at jaz@cwp.org.

Wayland Bass, the James City County Engineer, is managing the project for the County. He can be reached at: James City County, Development Management, 101-E Mounts Bay Road, P.O. Box 8784 Williamsburg, VA 23187-8784.

How do I sign up for stakeholder meetings and to get on a mailing list?

Contact Jenny West at the James River Association to be placed on our stakeholders' mailing list. You will be kept informed of all upcoming meetings regarding this project.

PHOTOGRAPHS AND ENDNOTES

A high quality tributary to Powhatan Creek near the intersection of Ironbound Road and Monticello Avenue

A forested wetland in Powhatan Creek watershed near the intersection of Centerville Road and John Tyler Memorial Highway

[1]A floodway is a term used to describe the limit of flooding that is likely to occur as a result of a major storm. A major storm is often referred to as the 100 year storm or the amount of rain that occurs on average once ever 100 years.
[2]Impervious cover is any surface in the developed landscape that cannot effectively absorb or infiltrate rainfall and contributes to stormwater runoff. These surfaces include streets, parking lots, rooftops, sidewalks, driveways, and patios and the like.